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Efficacy of Occipital Neuralgia Pain Management Injections

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Cover Page Footnote
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Abstract
This study examined the efficacy of one treatment option for chronic headache pain caused by occipital neuralgia (ON). The treatment is an injection containing a mixture of local anesthetic Marcaine and corticosteroid Depo-Medrol. The efficacy was determined according to the treatment's impact on each patient's pain level and quality of life, assessed via phone questionnaire. Electronic medical records (EMRs) were accessed, using the Epic EMR system, for adult patients who received at least one injection for the treatment of ON. Of 27 patients fitting the study criteria, 19 were successfully contacted, and 18 chose to participate in the study. This treatment was found to decrease a patient's pain level, on average, from 4.7/5.0 to 2.0/5.0. This quantitative result, along with patient testimonies and other qualitative information gathered through the questionnaire, leads to the conclusion that these injections are an effective option for relief of ON symptoms.

This study strove to evaluate how effective injections of Marcaine and Depo-Medrol are in reducing the severe headache pain associated with occipital neuralgia (ON). With little information available on using this type of injection for the management of ON, it is important to collect data that shows whether or not this treatment is having a tangible effect on those receiving it. This will assist both practitioners and patients in selecting treatment options for managing ON pain. This treatment has the potential to supplant other alternatives, including prescription and over-the-counter medications, which may become harmful, addictive, or ineffective when used long-term, as would be necessary with this type of chronic pain.

It is important to note that any injection bears some risk of irritation at the injection site, and the medications used in this study also carry with them the possibility of allergic reactions and side effects that should be discussed thoroughly with patients prior to treatment. The risk of injection site reactions may be diminished by being sure to inject the medications correctly, and insuring that injections are only given by licensed medical practitioners familiar with the procedure. The risk of infection at the injection site can be mitigated by preparing the skin prior to injection, using properly sterilized equipment and preventing contamination of medications through use of single-dose vials.

Since ON is characterized by debilitating headaches, photosensitivity, and other symptoms consistent with various Primary Headache Disorders (PHD), it can easily be misdiagnosed and treated as another PHD, especially migraine. The treatments for these seemingly similar disorders, such as prescription migraine medications, may be ineffective in reducing pain caused by ON inflammation. Therefore, another motive for this study was to bring attention to ON and its symptoms, and how they differ from other PHDs in diagnosis and treatment.

The term 'Headache Disorder' can be applied to a number of conditions affecting millions of individuals globally each year. Headache is a debilitating symptom of several primary headache disorders including migraine, tension-type headache (TTH), craniofacial neuralgias and cluster headache. Additionally, a headache can occur secondary to many other medical conditions and, as such, is one of the most common afflictions of the nervous system. While the severity of these disorders varies considerably, headache disorders are widely acknowledged to be potentially disabling, with migraines being cited as the leading cause of disability among neurological disorders (Steiner, Stovner, & Birbeck, 2013). Headache disorders have a combined estimated prevalence of 47% among adults worldwide, with an even higher percentage of the population experiencing some form of headache each year (World Health Organization, 2011). TTH and migraine, with estimated global prevalence of 20.1% and 14.7%, respectively, are the second and third most common diseases in the world in both males and females (Steiner, Stovner, & Birbeck, 2013). Additionally, migraine was found to be the seventh highest cause of disability globally, based solely on ictal disability (Steiner, Stovner, & Birbeck, 2013), or disability during an active disease episode.

The societal costs of headache disorders have been examined by several sources but can only be estimated at this point due to differences in data collection methods. One web-based

survey administered by the International Burden of Migraine Society looked at the societal costs of headache in individuals with both chronic and episodic migraine residing in the United States and found that the average total cost of a headache was $8243 each year for chronic migraine sufferers and $2649 each year for episodic migraine sufferers (Messali, et al., 2016). These figures include estimated direct costs, such as pharmaceutical and resource utilization, and indirect costs, which refer to reported headache-related productivity losses. With an estimated 14.7% of the global population suffering from migraine (Steiner, Stovner, & Birbeck, 2013), these costs are much higher than they seem at first glance and show merely an inkling of how much of an aggregate effect headache disorders have on society and the global population. The detrimental effects that such debilitating conditions may have on the familial lives and interpersonal relationships of affected individuals are less quantifiable, but are still important to consider. When other primary headache disorders and secondary occurrences of headache are taken into account as well, it is clear that headache poses a significant burden to society as well as to those affected individuals.

While migraine and TTH are two of the most common primary headache disorders, there are numerous others that can cause severe chronic pain and which receive much less attention due to their lower global prevalence. There are several disorders, classified as craniofacial neuralgias, which characteristically consist of sudden, intense pain along the distribution of one or more of the cranial or upper cervical spinal nerves which can be provoked by benign stimulation (allodynia) of the skin over the affected area or movement of the affected structures (Mikula, 2008). While the severity and frequency of these headaches can vary considerably, they often result in a high level of disability and discomfort during, and even between, ictal periods.

Occipital neuralgia (ON) is a primary headache disorder of the cervical nerves, and is characterized by intermittent paroxysmal shooting pain that occurs along the distribution of the greater, lesser or third occipital nerve. A relatively rare disorder, ON affects approximately 3.2 out of 100,000 people annually (Gadient & Smith, 2014). Consistent with the aforementioned craniofacial neuralgias, patients with ON often have discomfort or headache upon non-painful stimulation of the scalp in the occipital area. These headache pains tend to be particularly severe and are often thought to be related to some sort of triggering event, such as a fall, concussion, whiplash, or another incident resulting in inflammation of the posterior neck and scalp muscles and/or damage to the occipital nerves. There are also several case studies suggesting that ON can be caused by structural lesions (Dougherty, 2014). Patients with ON may also experience other symptoms, including nausea, dizziness, and photosensitivity, that are common with migraine headaches (Zaremski, et al., 2016). For these reasons, people suffering from ON may be misdiagnosed with migraine headaches or other primary headache disorders, the treatments for which are unsuccessful in relieving the severe headache pain.

Some doctors who are familiar with the musculoskeletal etiology of occipital neuralgia headache pain are using less commonly known techniques that produce significant relief in ON patients. One such treatment has been showing promising results for chronic sufferers in recent years. The treatment these patients receive is a unique injection of a crystalline corticosteroid along with a local anesthetic. Specifically, the injection contains a mixture of either 40 or 80 mg Depo-Medrol along with 2-4 cc of 0.5% Marcaine. This combination is used because the local anesthetic causes significant relief of headache pain within a few minutes of the injection, while also being a diagnostic tool for the identification of ON, and the slow-absorbing property of the crystalline corticosteroid provides relatively long-lasting relief of the inflammation in the head and

neck, which causes the pressure on the occipital nerves that produces the severe pain. Thus, the injection is simultaneously diagnostic and therapeutic. These patients may require repeated treatment with these injections over months or years based on how much inflammation is present and how frequently the headaches recur.

A retrospective chart review was performed to identify patients who fit the study criteria. This included adult patients who received at least one injection of 2-4 cc of .05% Marcaine and 40-80 mg Depo-Medrol for the treatment of occipital neuralgia. Electronic Medical Records were accessed using the Epic EMR system, and only patients receiving the treatment since the installation of Epic were included in this study. Each patient's phone number, age, gender, and treatment history were taken from their medical records, and this information was used to gather demographic information as well as to make contact with prospective participants. Children were excluded from this study. All personal medical information was de-identified to protect the patients' privacy. For each patient, no more than three attempts were made at making contact, and patients who could not be contacted were removed from the study. ON patients who received injections that did not exactly match the criteria described above were removed from the study.

A brief phone questionnaire was completed with each patient, focusing on pain level and quality of life before and after receiving their first treatment with the injections. Other data about the onset, severity, and frequency of their pain was collected as well (see Appendix A).

This study was reviewed and approved by an accredited Institutional Review Board prior to data collection. This project was determined to be a minimal risk study because the only patient identifier, medical record number, was removed prior to data analysis. Consent to take part in the phone questionnaire functioned as informed consent to participate in this study, which was made clear to all potential participants.

Epic EMR system identified 27 adult patients who received at least one injection of Depo-Medrol and Marcaine for the treatment of ON. Of these eligible individuals, 19 were successfully contacted, and 18 elected to participate in the study by responding to the questionnaire. The response rate for this study was 66.7%. The age distribution of participants ranged from 34-68, with a mean age of 51.4. The participant pool was 55.6% (10) female and 44.4% (8) male (Table 1).

Participant #	Age	Gender
10	44	F
11	55	M
12	37	F
13	56	M
14	55	F
15	54	F
17	34	F
19	45	F
21	46	F
28	59	F
31	55	M
34	68	M
41	59	M
47	58	M
49	50	M
50	52	F
55	43	F
61	55	M
Average	51.4	

Table 1. Participant Demographics

The distribution of events resulting in the onset of ON in these patients was 38.9% (7) following a single incidence of trauma to the head and/or neck; 27.8% (5) immediately following a motor vehicle accident; 16.7% (3) following a benign or prolonged incident, such as a sneeze or repetitive motion injury, and 16.7% (3) with no obvious cause of onset (Figure 1).

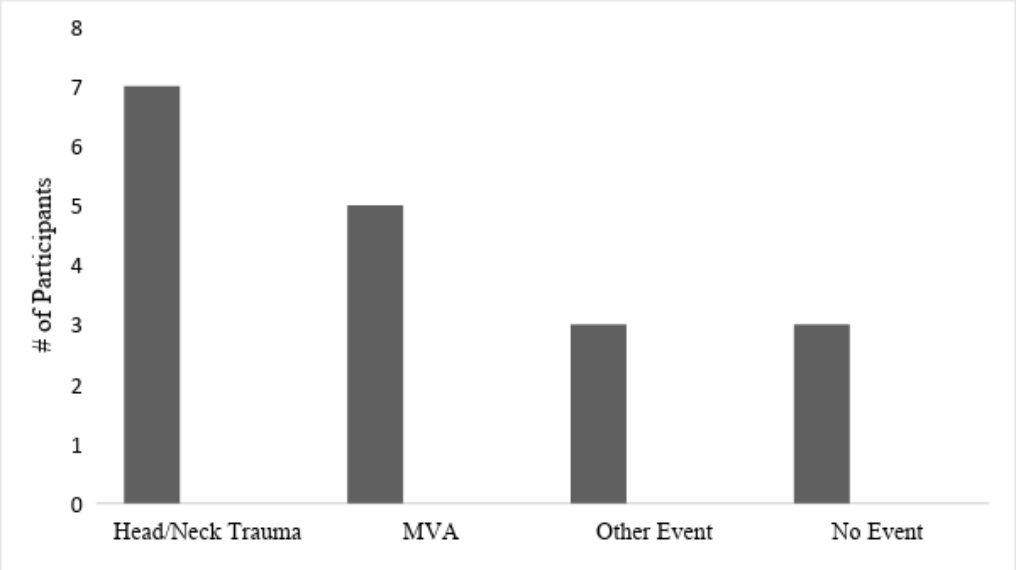

Figure 1. Distribution of Triggering Events

Prior to treatment with the injections, 22.2% (4) of these patients had been dealing with their pain for less than one month; 33.3% (6) for between one month and one year; 22.2% (4) for between one and five years; and 22.2% (4) for five or more years. Of those surveyed, before treatment, 55.6% (10) felt their headache pain constantly; 16.7% (3) felt their pain at least once a day; 16.7% (3) felt their pain at least 3 times a week; and 11.1% (2) felt their pain at least 3 times a month (Figure 2).

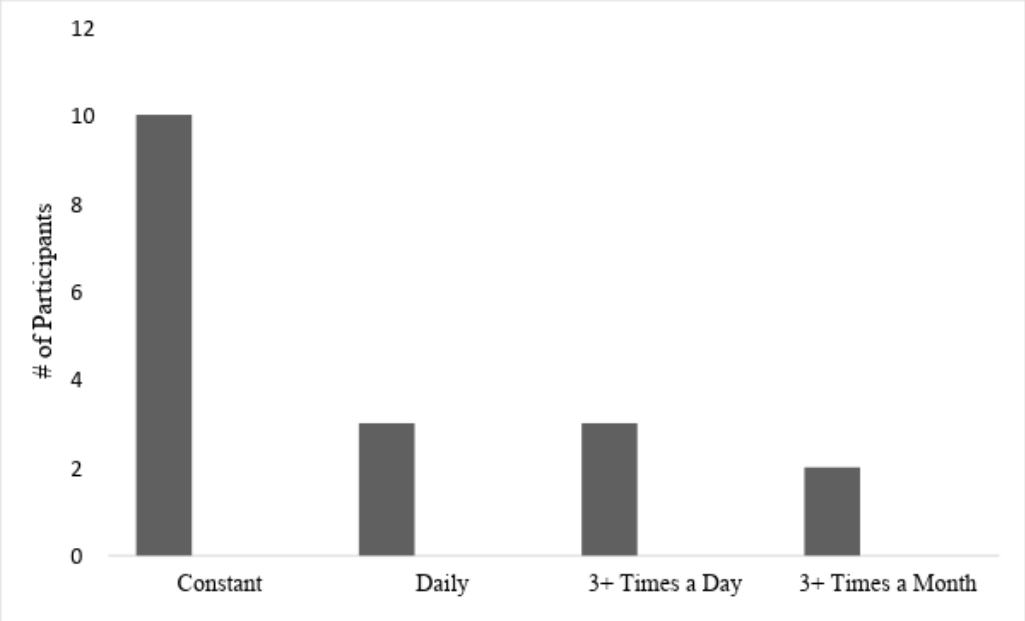

Figure 2. Frequency of Pain before First Injection(s)

In 66.7% (12) of the patients surveyed, over-the-counter and/or prescription pain medications were used prior to the injections, and were unsuccessful in providing adequate relief of ON symptoms. Patients also utilized TENS (transdermal electrical nerve stimulation) units, physical therapy, migraine medications, Inderal, Lidocaine patches, heat, and ice prior to treatment with the injections. While these methods might have had some immediate beneficial effects, they were not seen as providing a satisfactory level of pain-management in the patients surveyed. This lack of beneficial therapeutic options was often what led them to try the injections initially.

For this study, a numerical grading scale was used to quantify patients' pain levels. The scale ranged from 1.0 to 5.0, with 1.0 being equivalent to no pain, and 5.0 being equivalent to the worst pain possible. When asked, 94.4% (17) of the patients reported a noticeable decrease in their ON headache pain following their first injection. The average pain level of those surveyed, prior to their first injection(s) was a 4.68/5.00. Following their first injection(s) the average pain level was decreased to a 2.01/5.00. Prior to receiving their first injection(s), 72.2% (13) of the patients reported a pain level of 5.0/5.0, which was described by the researcher as "the worst pain

you can imagine" during the phone questionnaire. After receiving their first injection(s), 38.9% (7) of the patients reported a pain level of 1.0/5.0, which was described by the researcher as "no pain." 27.8% (5) of the patients reported a decrease in their pain level from 5.0, or maximum pain, before receiving the injection(s) to a 1.0, or no pain, after receiving their first injection(s) (Figure 3).

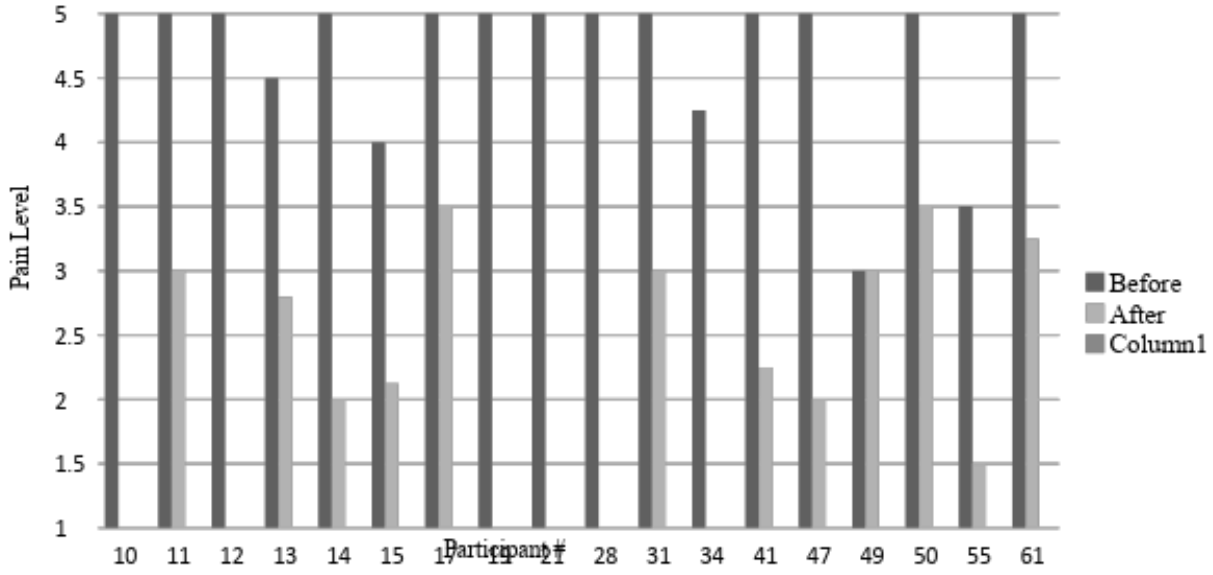

Figure 3. Pain Level Before and After First Injection(s)

Upon examination, the distribution of events leading to the onset of ON symptoms is consistent with the theory that the leading cause of ON is inflammation of the muscles in the head and neck, which puts pressure on the occipital nerves, resulting in pain. Therefore, the use of the corticosteroid in combination with the local anesthetic is tailored to ON by treating the painful symptoms as well as reducing the inflammation causing the symptoms. Depo-Medrol, in particular, is used in these patients because its crystalline structure gives it a long-acting property relative to other corticosteroids. Depo-Medrol works to reduce prominent inflammation over a

period of time. This is why, depending on the severity of a patient's symptoms, he or she may need one injection or several.

Prior to treatment with injections, the majority of these patients (55.6%) felt their headache pain constantly. 72.2% of those surveyed rated their ON pain prior to receiving any injections as the maximum level, 5.0/5.0, which was described as "the worst pain you can imagine" in the questionnaire. These statistics illustrate the extreme nature of this disorder, and how much of an impact it has on quality of life for the majority of those suffering from it. The high level of disability associated with primary headache disorders, and with ON in particular, further demonstrates the severity of the disease. These aspects of the study express the evident need for an effective treatment option to manage these patients' pain and restore their quality of life.

The patients who received treatment with these injections, for the most part, did so after other treatment options failed to reduce their pain to a satisfactory level. Various medications that can produce significant side effects, including several migraine medications and over-the-counter and prescription pain medications, were used, and in some cases for extended periods of time. Migraine medications and over-the-counter pain medications are ineffective at relieving the severe pain associated with ON. Narcotics can be harsh on the body, and may lead to abuse and addiction. Over-the-counter NSAIDs can cause damage to the heart and liver, especially with long-term use for chronic pain. These medications are merely attempting to mask the symptoms, as opposed to reduce the inflammation in the head and neck muscles that is likely causing the headaches.

The injections evaluated in this study, due to their corticosteroid component, work to reduce the inflammation in the head and neck muscles, and thus work to diminish the source of the ON symptoms. This makes it a less dangerous option than treating the symptoms with pain medications that can be addictive or cause damage to the body after extended use for chronic pain.

None of the patients surveyed reported any adverse effects after receiving the injections. This study shows that in the majority of patients, ON headache pain was significantly decreased, and in several cases eliminated entirely. If these injections can be given once or in a series over a certain period of time and actually eliminate the cause of ON as opposed to inadequately treating the symptoms, it should be widely acknowledged as doing such. This study strove to demonstrate that these injections can be effectively used to both treat the severe headache pain associated with ON and reduce the inflammation that is responsible for the headaches.

Several aspects of this study can be cited as limitations. This study relied on patient responses to the questionnaire, and thus is subjective in nature. Patient memory is not as accurate as medical records, and thus response-dependent studies will not be as accurate as purely retrospective studies. Additionally, the questionnaire used in this study only asked about the patients' first injections, since not all patients received multiple injections. This may have affected patient responses if they had received more than one treatment, as it might be harder for such patients to assess how they had been feeling after receiving their first treatment specifically. After any significant amount of time, it will be hard to differentiate how each specific treatment affected the patients. Going forward, surveying patients at more consistent points both pre- and post-injection will make the data collected more reliable. Due to the subjective nature of pain, this study cannot be as accurate as those relying on testable numbers. The quantitative aspect of this study relied upon patients' own interpretations of their pain, which cannot be entirely standardized. Additionally, this study is limited in its small sample size, as ON is not a highly prevalent condition and this treatment is not always utilized by patients with ON. However, this low prevalence may be due in part to the previously mentioned misconceptions that result in relatively common

misdiagnosis of ON as another primary headache disorder. Going forward, as more patients are surveyed for this study, the representativeness of the sample population will increase.

This study was successful in maintaining the privacy of the participants through the use of an anonymous phone questionnaire. Additionally, the quantification of pain levels into a numeric scale allowed for the effect of the treatment to be determined effectively. The results found in this study are remarkable in their relevance to modern healthcare. This treatment was successful in managing ON pain in patients who had been largely unsuccessful with other methods and medications. The diagnostic aspect of this treatment will hopefully decrease the number of patients with ON who are misdiagnosed with other primary headache disorders, while its significant effect on pain levels will be important for those suffering from ON symptoms.

Future work for this study will focus on surveying all new ON patients, using a similar questionnaire, immediately prior to their first treatment with the injections. EMR chart review and phone surveying will continue to follow up with patients post-injection to track their progress. Together, these efforts will be able to better evaluate the efficacy of this treatment as well as to increase the number of study participants, increasing the representativeness of the sample population.

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Appendix A

Follow-up Script – Occipital Neuralgia Injections

Participant #: _____ Age: ____ Gender: •M •F Date of Call: _____/_____/_____

Hello, we are conducting a follow-up research study on patients who were given injections for treatment of Occipital Neuralgia/Headache pain. We want to evaluate how the treatment has been working.

Our records show that you first received this treatment on or about ___/___/___ (date). Does that sound right? • yes • no

Would you mind if I ask you some questions about your treatment? This is voluntary and completely confidential, I only have 7 questions and it will take about 5 minutes of your time. • yes • no

If no: "Is there a better time for me to call you back?" _____

If no: "Thank you for your time." End call.

If yes: proceed with questionnaire…

Thank you. You can stop me at any time, or skip any questions you do not wish to answer.

1. When did your headache pain begin? _____
   Was it following an accident, fall, or head/neck trauma? • yes • no
   If yes: Please describe the accident or injury:
   _____
2. How often did your head hurt before you started treatment with the injections? _____
3. How long did you have your headaches before your injection(s)? _____ •W •M •Y
4. Did you try any other medications or treatments before receiving your injection? _____
   If yes, what were they? _____
5. On a scale of 1 to 5, with 1 being no pain, and 5 being the worst pain you can imagine, how would you rate your headache pain **before** you started receiving the injections? ____
6. After receiving **your first** injection, did you have a noticeable reduction in your headache pain? • yes • no
   If yes: On a scale of 1 to 5, how would you rate your headache pain **after** your first injection? _____
   If no: Was your headache pain worsened? _____
   If no: So, you're saying there was no change in your headache pain?
   • correct • incorrect
7. Did you receive more than one injection as part of your treatment? _____
   If yes: How many injections have you had? _____
   How frequently have you been receiving your injections? _____
   Do you plan on receiving additional injections in the future? _____
   If no: How long has it been since your last injection? _____
   Do you plan to receive additional injections? _____

That's all of the questions I have for you. Thank you so much for your time. If you have any follow-up questions, please call our Institutional Review Board at (570) 887-4885.